

Nov. 6, 1951

C. HESS

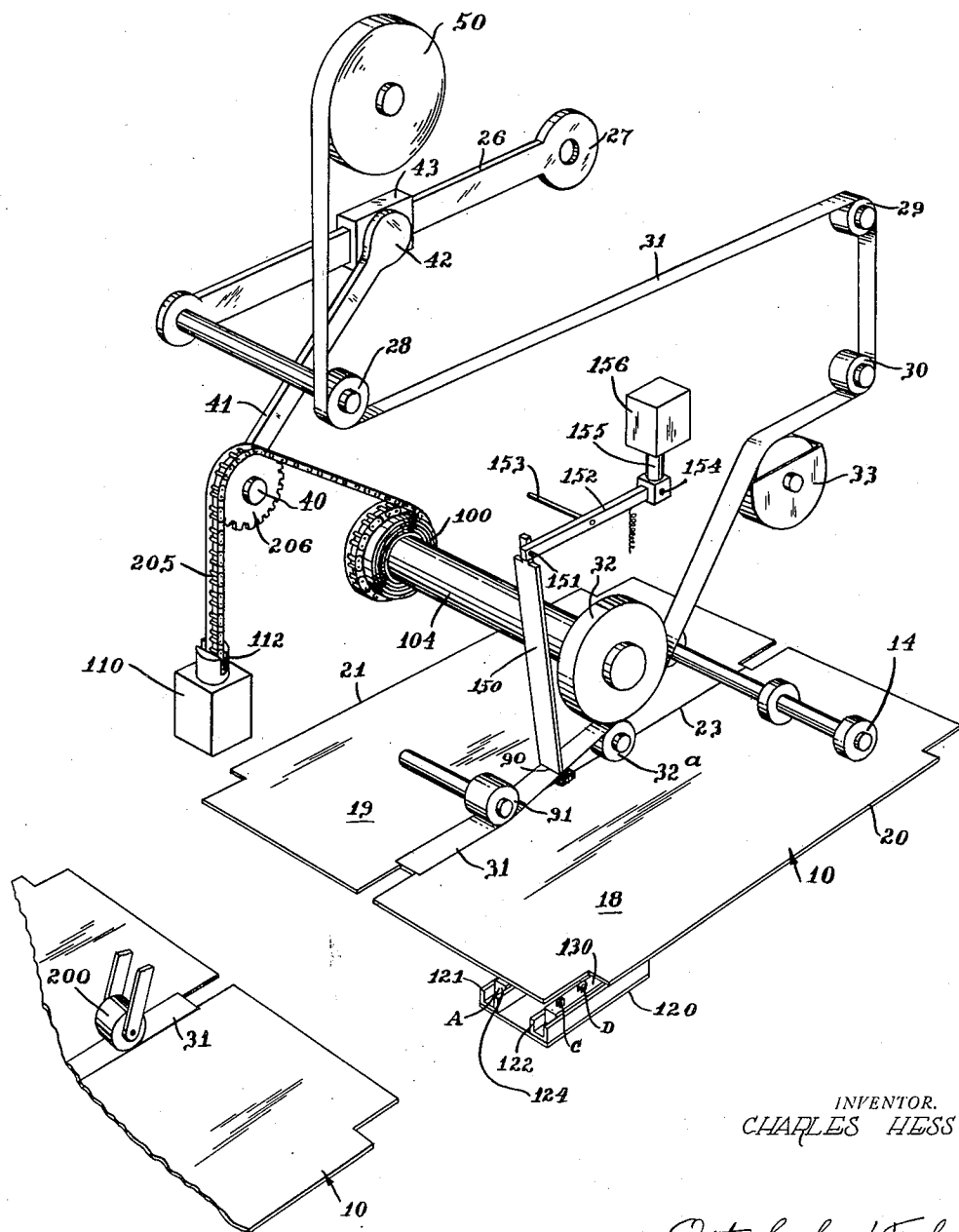
2,574,181

TARGET OPERATED TAPING MACHINE

Filed March 13, 1948

2 SHEETS--SHEET 1

Fig 1



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2 SHEETS—SHEET 2

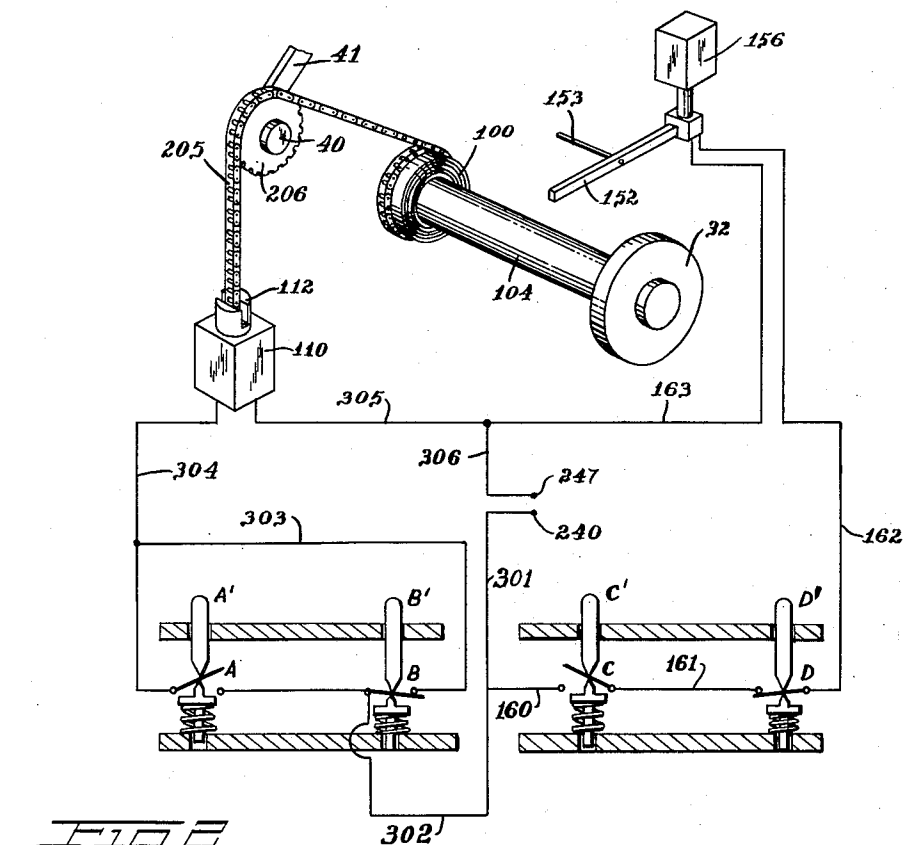


FIG. 2

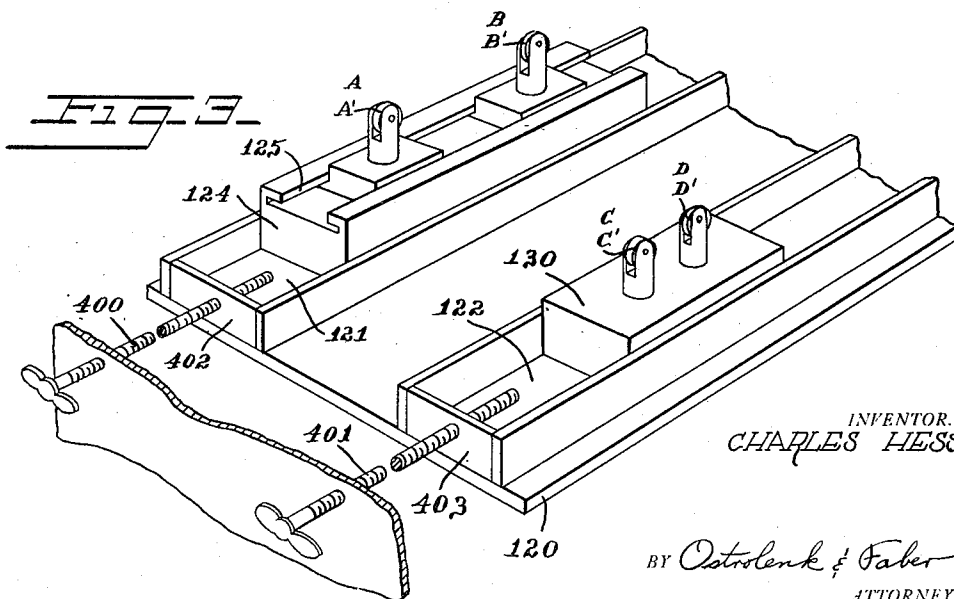


FIG. 3

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TARGET OPERATED TAPING MACHINE

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10 Claims. (Cl. 216—23)

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My present invention relates to taping machines and more particularly to a taping machine adapted to tape the seam of folded corrugated board or other fibre board boxes passed there-through preferably by means of taping operations initiated by the passage of the box through the apparatus.

More particularly, my invention relates to a taping machine of the general type disclosed in Patent No. 2,467,275 issued April 12, 1949 wherein, however, switching means operated by the passage of the box through the machine initiates the tape feeding operation and performs the tape cutting operation.

My present invention is a modification of the invention disclosed by me in application Serial No. 787,159, filed November 20, 1947 now Patent No. 2,564,901 issued August 21, 1951.

In taping machines of this general type, it is necessary to feed out the tape to a position where it may be pressed down at the leading edge of the seam. Thereafter, the box as it moves through the machine pulls out the tape; at the conclusion of the taping operation when the trailing end of the seam is reached, it is necessary to cut off the tape so that the trailing end of the tape will coincide with the trailing end of the seam.

Various mechanical means have been utilized in order to accomplish these various operations, these means being primarily interconnected with the blank feeding elements in order to produce appropriately phased operations.

Attempts have also been made to initiate the taping cycle by a target type switch operated by the box as it moves through the machine but no means have been provided for terminating the tape feeding cycle at any particular desired adjustable point or for obtaining the tape cutting operation by means originally initiated by target type switching apparatus.

The primary object of my present invention, therefore, is the provision of electromechanical means for applying the tape and cutting off the tape at the proper point as a folded box moves through the taping machine.

Another object of my invention is the provision of novel means for utilizing the movement of the box through the machine not only for initiating the tape feeding operation but also for initiating the tape cutting operation.

Another object of my invention is the provision of novel means in addition to the foregoing and dependent on the movement of the box through the taping machine for controlling the length of the tape feeding operation.

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Still another object of my invention is the provision of novel means dependent on the movement of the box through the taping machine for initiating and controlling the tape feeding operation and for cutting off the tape at the proper point, all of the said means being readily adjustable in accordance with the length of the seam to be taped.

A specific object of the present invention is the provision of solenoid operated tape feeding means in which a solenoid member tensions a feed roll and the solenoid is de-energized to permit the feed roll to operate as the blank passes through the machine and by means operated by the blank.

Another object is the provision of novel tape feeding means.

The foregoing and many other objects of my invention will become apparent in the following description and drawings in which:

Figure 1 is a schematic view in perspective illustrating my invention.

Figure 2 is a circuit diagram illustrating my invention.

Figure 3 is a schematic perspective showing the means for adjusting the switch elements of my invention.

Referring now to Figure 1, the folded blank 10 is fed forward in any suitable manner by the feed rolls 14.

Each folded blank 10 comprises essentially a tubular box having panels 18 and 19 which have been folded down around the fold lines 20, 21 with the edges of the panels 18 and 19 meeting to form the seam 23.

My device is designed to apply a length of tape 31 to the seam 23 in order to finish the tubular box.

The supply roll 50 for the tape 31 and the tape feeding means comprises a lever 25 pivotally mounted at 27 and having a roller 28 at its opposite end. The tape 31 then passes over idlers 29, 30 and adhesive moistener 33 to the tape feeding rolls 32 and 32a.

Roller 32 on shaft 104 is spring biased by spring 100 in a clockwise direction to feed the tape out; roller 32a acts as an idler.

Solenoid 110 has its armature connected by chain 205 passing over sprocket 206 to the roller 32 where it is wrapped in a clockwise direction about the shaft 104 of roller 32.

When the solenoid 110 is energized, it pulls armature 112 down, pulling chain 205 and winding shaft 104 in a counterclockwise direction. Roller 32 has an over-running clutch or pawl and ratchet connection to shaft 104 so that when

shaft 104 rotates counter-clockwise, roller 32 remains stationary but when shaft 104 rotates in a clockwise direction with respect to Figure 1, it drives roller 32.

When the solenoid 110 is de-energized by movement of the box blank as hereinafter described, spring 100 drives shaft 104 to drive roller 32 to feed out tape 31 up to and under pressure roller 91.

The solenoid 110 is re-energized by movement of the box blank when the tape has entered under pressure roller 91. When re-energized, it winds up the shaft 104 again tensioning spring 100 and pulling up the chain 205 over sprocket 206.

Sprocket 206 is rotatably mounted at 40 on the end of link 41 which is pivotally connected at 42 to slide 43 on lever 26. When the chain 205 is pulled by solenoid 110, sprocket 206 is pulled down pulling down link 41 and lever 26 and its roller 28, thereby pulling out a slack loop of tape for the next operation.

When the tape is pulled out by the next taping operation, roller 28 and lever 26 rise to be drawn down again when the solenoid is re-energized to pull out another slack loop.

Heretofore many attempts have been made to simplify the operation of the tape feeding and tape cutting means. This has resulted in rather complex mechanical arrangements utilizing cams of various kinds to operate both the tape feeder and the tape cutter; and it was necessary to provide complex mechanical means for adjusting these cam arrangements to various sizes of boxes and for variations in the length of flap and the length of seam in the box.

My invention is directed specifically to simplified apparatus operated by the movement of the box itself for initiating the tape feeding and tape cutting operation. Primarily, my invention utilizes electrically operated means for controlling both the tape feeding and tape cutting operations, and, therefore, makes possible the use of simplified switching apparatus operated by the movement of the box itself to control these means.

When the tape is fed under the pressure roll 91, the box blank to which the leading edge of the tape is secured pulls out the tape past the roll 32, the ratchet or over-running clutch arrangement in the roll 32 permitting this to occur.

Accordingly, it is only necessary actually to feed out approximately three inches of tape irrespective of the length of the seam since after the leading edge of the tape has been applied to the box blank, the movement of the box blank serves to draw out the remaining tape needed for the seam.

In some cases and for specific operating reasons it may be necessary to vary the amount of tape actually fed out by operation of roll 32 in a clockwise direction.

Heretofore adjustments to obtain variations in the length of feed have required complex mechanical apparatus. My novel device requires merely the utilization of two switches A and B for this adjustment.

Heretofore also it has been necessary to provide mechanical means for operating the knife to cut the length of tape after it has been pulled out so that the length pulled out equals the length of the seam. My novel knife cutting operation requires merely the adjustment of a single unit containing a switch in order to operate the cutting knife at the appropriate time.

In addition, since the operation of the knife is electrical in my novel device, it is desirable that

the mechanism for operating the knife be de-energized immediately after operation. For this purpose, instead of a single switch, two switches in series are used as hereinafter described in order to ensure that the knife operating mechanism is de-energized as soon as the cutting operation has taken place.

These switches need not be adjusted with respect to each other and thus may be moved simultaneously.

Heretofore, in making adjustments of various kinds in prior taping machines to allow for the length of the flap in order that the tape may be applied at the proper point on the box at the beginning of the seam and in making adjustments for the length of feed-out of the tape and also in making adjustments of the knife cutting mechanism to cut the tape after an appropriate length has been fed out, it was necessary for the operator to adjust various parts of the mechanism at various points remote from each other.

My novel device makes it possible to place all of the adjustments at a single location preferably at or adjacent the portion of the taping machine at which the tape is applied and cut off.

Switches A and B are operated by the leading edge of the box blank 10 to control the operation of solenoid 110. Switch A is normally open and switch B is normally closed, being held in their respective positions by yielding means as, for instance, the compression springs shown. Switch A is forward of the switch B so that it will be struck later by the leading edge of the box blank. Switches A and B are provided, respectively, with operators A' and B' which are pushed down by the leading edge of the box and held down by the undersurface of the box blank as it moves along.

Switch B is spaced forward of the tape feeding element by an amount equal to the length of flap of the box so that when the leading edge of the box closes switch B by pressing down the switch operator B', the leading end of the seam will be just under the tape that is fed out. Switch A is spaced forward of switch B by an amount equal to the length of tape to be fed out.

Opening of switch B de-energizes solenoid 110 to permit spring 100 to drive shaft 104 and feed roller 32 to feed out tape. Closing of switch A thereafter energizes solenoid 110 to restore the tension of spring 100 as previously described.

Thus, the spacing of switches A and B controls the length of tape to be fed out which preferably is of the order of three inches, the box then pulling out the remainder of the tape. Consequently, switches A and B will ordinarily be adjusted simultaneously since usually the amount of tape to be fed out is constant irrespective of the length of the box. This is so because the box blank itself pulls out the remainder of the tape. Thus, at the area at which tape is first applied to the box, a platform 120 (Figures 1 and 3) is provided with two tracks 121 and 122. Track 121 carries the slide 124 which in turn is provided with track 125.

Switches A and B are slidably mounted in track 125 in order to obtain the proper adjustment between switches A and B. Ordinarily switches A and B will not be slid with respect to each other in track 125 unless a change in the actual length of the original feed-out of the tape is required. But slide 124 will be moved back and forth in the track 121 whenever it is necessary to adjust the position of switch B for variations in the length of flap of successive sets of boxes. This makes it possible to adjust switches A and B simultaneous-

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ly, maintaining the relationship between switches A and B, switch B being, of course, the controlling switch which must be accurately adjusted.

Track 122 provides an adjustment for the slide element 130 which carries switches C and D. Switches C and D need not be adjusted with respect to each other and accordingly are not adjustably mounted in the slide element 130 but are rigidly mounted therein. Switch C is normally open and switch D normally closed, being held in their respective positions by the compression springs shown.

In Figure 2, it will be seen that solenoid 110 is energized from terminals 247 over conductors 301, 302 normally closed switch B, conductors 303 and 304 to solenoid 110 and conductors 305 and 306 to terminal 247. When the blank advances, it first opens the switch B. This de-energizes solenoid 110 to permit spring 100 to rotate shaft 104.

When the leading edge of the blank strikes switch A, it closes a circuit paralleling switch B to re-energize the solenoid. The solenoid 110 remains energized while the blank passes over switch A. But before the blank leaves switch A, it first leaves switch B permitting it to close so that solenoid 110 remains energized. The solenoid 110 is thus de-energized only while the leading edge of the blank passes from switch B to switch A. The distance between these two switches thus determines the length of the tape feed-out.

Thereafter, the box blank to which the leading edge of the tape has been secured pulls out the tape, the ratchet or over-running clutch arrangement in the feed-out roller 32 permitting this to occur.

The cutting knife 90 is located at the lower end of the arm 150 which is rigidly secured at 151 to the lever 152, which in turn is pivoted at the cross-shaft 153. The opposite end of lever 152 is pivotally connected at 154 to the solenoid armature 155 of solenoid 156. When solenoid 156 is energized it attracts its armature 155 to cause lever 152 to pivot in a counterclockwise direction about its shaft 153 to cause arm 150 carrying cutting knife 90 to move down and cut the tape 31.

Solenoid 156 is energized by the movement of the box blank in order to effect this cutting operation. This energization occurs when the box blank leaves the switch D. As the box blank moves along the path it first strikes switch operator D' of switch D and opens switch D; then it strikes operator C' of switch C and closes switch D. Switches C and D are in series with solenoid 156, the circuit therefor extending from terminal 240 and conductors 301 and 160 to switch C; conductor 161 to switch D, then over conductor 162 to the solenoid 156 and then through conductors 163 and 306 to terminal 147.

Thus, before the box blank moves into position over switches C and D, the circuit for solenoid 156 is open at switch C. While the box blank is moving over switches C and D, switch C is closed but switch D is open so that the circuit for solenoid 156 still remains open. When the box blank leaves switch D, then switch D closes, energizing solenoid 156 to operate the knife 90 to cutting position, switches C and D in series with solenoid 156 being closed at this time.

Immediately after this operation, the box blank leaves switch C permitting switch C to open and thus de-energizing the solenoid to permit knife blade 90 to be raised. An appropriate tension spring 170 may be provided connected to lever 152 to maintain knife 90 in raised position.

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It will thus be seen that the switches A and B, mounted on the slide 124, and switches C and D, mounted in the block 130, may all be located in the same region or area at the point at which the tape is first applied, thereby simplifying the adjustment operation.

These switches may be adjusted in accordance with the length of flap so that the tape will be applied at the beginning of the seam and the tape will be cut off to match the trailing end of the seam. The tape is first pressed down by the roller 84 and then further pressed down and smoothed by the pressure rollers 200, 200.

The switches may be adjusted from the front of the machine while the machine is running by screws 400 and 401 connected to extended flanges 402, 403 of blocks 124 and 130.

In the foregoing, I have described my invention solely in connection with specific illustrative embodiments thereof. Since many variations and modifications of my invention will now be obvious to those skilled in the art, I prefer to be bound not by the specific disclosures herein contained but only by the appended claims.

I claim:

1. In a taping machine for applying tape to the seam of a folded box blank, means for moving the box blank through the machine, means for supporting a tape supply, tape feeding and applying apparatus for applying the leading edge of the tape to the leading edge of the seam, tape cutting apparatus for cutting the tape after a length thereof equal to the length of the seam has been drawn from the tape feeding and supply apparatus; said tape feeding and supply apparatus and said tape cutting apparatus being electrically controlled; said tape feeding and supply apparatus comprising a feed roller said feed roller being resiliently urged toward one angular position for rotation in a feeding direction; said electrical control means comprising a solenoid, a connecting member between said solenoid and feed roller said solenoid when energized moving and maintaining said feed roller in a position angularly removed from said first-mentioned angular position; said solenoid being normally energized; switch means operable by the passage of a box through the machine to de-energize and then energize the solenoid.

2. In a taping machine for applying tape to the seam of a folded box blank, means for moving the box blank through the machine, means for supporting a tape supply, tape feeding and applying apparatus for applying the leading edge of the tape to the leading edge of the seam, tape cutting apparatus for cutting the tape after a length thereof equal to the length of the seam has been drawn from the tape feeding and supply apparatus; said tape feeding and supply apparatus and said tape cutting apparatus being electrically controlled; said tape feeding and supply apparatus comprising a feed roller said feed roller being resiliently urged toward one angular position for rotation in a feeding direction; said electrical control means comprising a solenoid, a connecting member between said solenoid and feed roller said solenoid when energized moving and maintaining said feed roller in a position angularly removed from said first-mentioned angular position; said solenoid being normally energized; switch means operable by the passage of a box through the machine to de-energize and then energize the solenoid; and additional switch means operable by the passage of the box blank through

the machine for successively energizing and de-energizing said tape cutting apparatus.

3. In a taping machine for applying tape to the seam of a folded box blank, means for moving the box blank through the machine, means for supporting a tape supply, tape feeding and applying apparatus for applying the leading edge of the tape to the leading edge of the seam, tape cutting apparatus for cutting the tape after a length thereof equal to the length of the seam has been drawn from the tape feeding and supply apparatus; said tape feeding and supply apparatus and said tape cutting apparatus being electrically controlled; said tape feeding and supply apparatus comprising a feed roller said feed roller being resiliently urged toward one angular position for rotation in a feeding direction; said electrical control means comprising a solenoid, a connecting member between said solenoid and feed roller said solenoid when energized moving and maintaining said feed roller in a position angularly removed from said first-mentioned angular position; said solenoid being normally energized; a first switch operable by the passage of the box through the machine to de-energize the solenoid to permit the feed roller to return to said first-mentioned angular position to effect a feeding operation.

4. In a taping machine for applying tape to the seam of a folded box blank, means for moving the box blank through the machine, means for supporting a tape supply, tape feeding and applying apparatus for applying the leading edge of the tape to the leading edge of the seam, tape cutting apparatus for cutting the tape after a length thereof equal to the length of the seam has been drawn from the tape feeding and supply apparatus; said tape feeding and supply apparatus and said tape cutting apparatus being electrically controlled; said tape feeding and supply apparatus comprising a feed roller said feed roller being resiliently urged toward one angular position for rotation in a feeding direction; said electrical control means comprising a solenoid, a connecting member between said solenoid and feed roller said solenoid when energized moving and maintaining said feed roller in a position angularly removed from said first-mentioned angular position; said solenoid being normally energized; a first switch operable by the passage of the box through the machine to de-energize the solenoid to permit the feed roller to return to said first-mentioned angular position to effect a feeding operation, and a second switch operable by the passage of the box through the machine to energize the solenoid while the box continues to engage the first switch.

5. In a taping machine for applying tape to the seam of a folded box blank, means for moving the box blank through the machine, means for supporting a tape supply, tape feeding and applying apparatus for applying the leading edge of the tape to the leading edge of the seam, tape cutting apparatus for cutting the tape after a length thereof equal to the length of the seam has been drawn from the tape feeding and supply apparatus; said tape feeding and supply apparatus and said tape cutting apparatus being electrically controlled; said tape feeding and supply apparatus comprising a feed roller said feed roller being resiliently urged toward one angular position for rotation in a feeding direction; said electrical control means comprising a solenoid, a connecting member between said solenoid and feed roller said solenoid when energized moving

and maintaining said feed roller in a position angularly removed from said first-mentioned angular position; said solenoid being normally energized; switch means operable by the passage of a box through the machine to de-energize and then energize the solenoid; a connection between said solenoid and said tape supply for drawing a slack loop from said tape supply when said solenoid is energized.

6. In a taping machine for applying tape to the seam of a folded box blank, means for moving the box blank through the machine, means for supporting a tape supply, tape feeding and applying apparatus for applying the leading edge of the tape to the leading edge of the seam, tape cutting apparatus for cutting the tape after a length thereof equal to the length of the seam has been drawn from the tape feeding and supply apparatus; said tape feeding and supply apparatus and said tape cutting apparatus being electrically controlled; said tape feeding and supply apparatus comprising a feed roller said feed roller being resiliently urged toward one angular position for rotation in a feeding direction; said electrical control means comprising a solenoid, a connecting member between said solenoid and feed roller said solenoid when energized moving and maintaining said feed roller in a position angularly removed from said first-mentioned angular position; said solenoid being normally energized; switch means operable by the passage of a box through the machine to de-energize and then energize the solenoid; said connection between said solenoid and said feed roller comprising a connection to said tape supply for drawing a slack loop from said tape supply when said solenoid is energized.

7. In a taping machine for applying tape to the seam of a folded box blank, means for moving the box blank through the machine, means for supporting a tape supply, tape feeding and applying apparatus for applying the leading edge of the tape to the leading edge of the seam, tape cutting apparatus for cutting the tape after a length thereof equal to the length of the seam has been drawn from the tape feeding and supply apparatus; said tape feeding and supply apparatus and said tape cutting apparatus being electrically controlled; said tape feeding and supply apparatus comprising a feed roller said feed roller being resiliently urged toward one angular position for rotation in a feeding direction; said electrical control means comprising a solenoid, a connecting member between said solenoid and feed roller said solenoid when energized moving and maintaining said feed roller in a position angularly removed from said first-mentioned angular position; said solenoid being normally energized; switch means operable by the passage of a box through the machine to de-energize and then energize the solenoid; said connection between said solenoid and said feed roller comprising a longitudinal flexible member; said flexible member being moved longitudinally when said solenoid is energized.

8. In a taping machine for applying tape to the seam of a folded box blank, means for moving the box blank through the machine, means for supporting a tape supply, tape feeding and applying apparatus for applying the leading edge of the tape to the leading edge of the seam, tape cutting apparatus for cutting the tape after a length thereof equal to the length of the seam has been drawn from the tape feeding and supply apparatus; said tape feeding and sup-

ply apparatus and said tape cutting apparatus being electrically controlled; said tape feeding and supply apparatus comprising a feed roller said feed roller being resiliently urged toward one angular position for rotation in a feeding direction; said electrical control means comprising a solenoid, a connecting member between said solenoid and feed roller said solenoid when energized moving and maintaining said feed roller in a position angularly removed from said first-mentioned angular position; said solenoid being normally energized; switch means operable by the passage of a box through the machine to de-energize and then energize the solenoid; said connection between said solenoid and said feed roller comprising a longitudinal flexible member; said flexible member being moved longitudinally when said solenoid is energized, a movable idler, said tape passing around said idler on the side thereof away from said tape supply; a connection between said idler and said flexible member; said flexible member moving said idler away from said tape supply to create a slack loop when said flexible member is moved longitudinally.

9. In a taping machine for applying tape to the seam of a folded box blank, means for moving the box blank through the machine, means for supporting a tape supply, tape feeding and applying apparatus for applying the leading edge of the tape to the leading edge of the seam, tape cutting apparatus for cutting the tape after a length thereof equal to the length of the seam has been drawn from the tape feeding and supply apparatus; said tape supply comprising a roll of tape; a rotatable idler adjacent said roll of tape

and movable away from said roll; said tape passing around said idler on the side thereof remote from said tape supply; a connection between said idler and said tape feeding apparatus for moving said idler away from said tape supply to create a slack tape loop at each operation of the tape feeding apparatus.

10. In a taping machine for applying tape to the seam of a folded box blank, means for moving the box blank through the machine, means for supporting a tape supply, tape feeding and applying apparatus for applying the leading edge of the tape to the leading edge of the seam, tape cutting apparatus for cutting the tape after a length thereof equal to the length of the seam has been drawn from the tape feeding and supply apparatus; said tape supply comprising a roll of tape; a rotatable idler adjacent said roll of tape and movable away from said roll; said tape passing around said idler on the side thereof remote from said tape supply; a connection between said idler and said tape feeding apparatus for moving said idler away from said tape supply to create a slack tape loop at the conclusion of each operation of the tape feeding apparatus.

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